NEARCTIC *GLYPTA* PARASITES (HYMENOPTERA: ICHNEUMONIDAE) OF CONIFER FEEDING OLETHREUTIDAE (LEPIDOPTERA)[1]

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ABSTRACT: The Nearctic species of *Glypta* Gravenhorst which parasitize larvae of Olethreutidae that feed in cones or shoots of conifers are described. These are *Glypta evetriae* Cushman and three new species: *zozanae, eucosmae,* and *rhyacioniae.* The cephalic structures of the last instar of *eucosmae* larvae are described and illustrated.

Four Nearctic species of *Glypta* Gravenhorst, parasites of several species of Lepidoptera of the family Olethreutidae, whose larvae feed in the cones or shoots of conifers, were studied and are described. These include *Glypta evetriae* Cushman and three new species. *G. evetriae* occurs in the western Nearctic where it parasitizes the larvae of *Barbara colfaxiana* Kearfott which feed in the cones of *Pseudotsuga menziesii* (Mirb.) Franco. The three other species all attack olethreutid larvae that bore in the shoots of *Pinus* species. One of the latter, which closely resembles *evetriae,* is known, as yet only from lower elevations of the Sierra region of central California where it has been reared from *Rhyacionia zozana* (Kearfott), a borer in shoots of *Pinus ponderosa* Lawson. The other two species occur in the eastern Nearctic where one is a parasite of the Nantucket pine tip moth, *R. frustrana* (Comstock); the other parasitizes *Eucosma gloriola* Heinrich and *E. cocana* Kearfott. Both species of *Eucosma* are borers in shoots of *Pinus* species. The two eastern species of *Glypta* resemble each other very closely and differ more widely from the two western species which in turn are similar.

Key to Species

1. Temple rather long and not, or only weakly, receding (Figs. 1, 2); face as wide as, or a little wider than, length of eye. Western Nearctic 2

   Temple rather short and strongly receding (Figs. 3, 4); face slightly narrower than length of eye. Eastern Nearctic 3

2. Temple not or only very slightly receding (Fig. 1); propodeum with median longitudinal carinae absent or very weak and usually incomplete . . . . . *evetriae* Cush.

   Temple weakly receding (Fig. 2), propodeum with distinct, complete, median longitudinal carinae . . . . . *zozanae* n. sp.

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3. Occipital carina extending to base of mandible; ovipositor sheath about as long as propodeum and abdomen combined; first abdominal tergite in female slightly wider (1.04-1.31) than long . . . . . *eucosmae* n. sp.

Occipital carina intersecting oral carina close to base of mandible (distance from point of intersection to base of mandible about equal to diameter of terminal segment of maxillary palpus); ovipositor sheath about as long as thorax and abdomen combined; first abdominal tergite of female slightly narrower (0.83-0.97) than long . . . . . *rhyacioniae* n. sp.

Glypta evetriae Cushman

Glypta evetriae Cushman, 1917. Proc. U.S. natn. Mus. 53: 469. Types, 5 females, 4 males, reared from *Evetria taxifoliella* Busck in cones of *Pseudotsuga menziesii,* at Ashland, Oregon, USNM.
Glypta evetriae; Viereck, 1925. Ann. Rpt. ent. Soc. Ont. 55: 102.

Female – Length: front wing 5.3 - 6.0 mm, ovipositor sheath 5.2 - 5.5 mm. Face 1.08 - 1.20 as wide as length of eye. Occipital carina narrowly incomplete above, extending below to base of mandible, not sinuate opposite lower part of eye. Temple very broad, broadly rounded and not receding except in posterior 0.35 (Fig. 1). Gena in front view very strongly rounded. Ocellocular space slightly greater than diameter of lateral ocellus. Malar space about 0.55 basal width of mandible. Apical margin of clypeus weakly convex, without median notch. Antennal flagellum with about 34 articles. Face and base of clypeus with dense, rather fine punctures. Frons with very dense, rather coarse punctures; region above antennal sockets with a few short, transverse wrinkles.

Thorax moderately stout; epomia short; notaulus very weak, ending a little before middle of mesoscutum. Propodeum with distinct, but often rather weak, apical transverse carina; median longitudinal carinae absent or weak and usually incomplete; costulae and lateral longitudinal carinae absent; posterior declivity of propodeum evenly, densely punctate.

Abdomen moderately stout; tergites with coarse, dense and often confluent punctures; first tergite moderately convex in profile, 1.00 - 1.06 as wide at apex as long; second tergite 1.49-1.55 as wide as long; tergites 2 to 4 with strong, oblique impressions; tergites 5 and 6 strongly retracted. Ovipositor sheath about as long as thorax and abdomen combined.

General colour of body black. Clypeus usually black, but sometimes dull yellowish or brownish except at base. Mandibles black. Palpi mostly pale brownish with labial palpus and first and second segments of maxillary palpus blackish. Legs colored as in *eucosmae.*

Male – Closely resembling female in structure and colour. Differs in structure in having flagellum with 2 or 3 additional articles, abdominal tergites more elongate with tergites 5 and 6 only slightly retracted, and hind tarsus usually blackish except for a very narrow whitish annulus at base of first segment.

Specimens Examined. CANADA, British Columbia (10 males, 17 females), Agassiz, May 5, 1922, R. Glendenning; Cowichan, reared from *Barbara colfaxiana,* May 13, 1935, May 5-15, 1958, Apr. 26, 1951, Mar. 7-11, 1951, D. Radcliffe; Cowichan Lake, Mar. 17, 1958, Mar. 22, 1952; Crofton, reared from *B. colfaxiana,* June 13, 1952; Franklin River, reared from *B. colfaxiana;* Oyster Bay, reared from *B. colfaxiana,* June 13, 1952; Oyster River, Vancouver Is., reared from cones of *Abies grandis,* G.R. Hopping; Pigoot Creek, reared from *B. colfaxiana coloradensis,* June 5, 1953. UNITED STATES, Montana, Missoula; Oregon (4 males, 5 females), Ashland, reared from *Evetria taxifoliella* in cones of *Pseudotsuga menziesii.*

Distribution. (Fig. 7).

Glypta zozanae n. sp.

Holotype female – Length: front wing 5.8 mm; ovipositor sheath 5.5 mm. Face 1.0

as wide as length of eye. Occipital carina narrowly incomplete above, extending below to base of mandible, weakly sinuate opposite lower part of eye. Temple broad, very broadly rounded, weakly receding (Fig. 2). Gena in front view rather strongly rounded. Ocellocular space slightly greater than diamter of lateral ocellus. Malar space 0.60 basal width of mandible. Antennal flagellum with 36 articles.

Propodeum with distinct apical transverse and median longitudinal carinae.

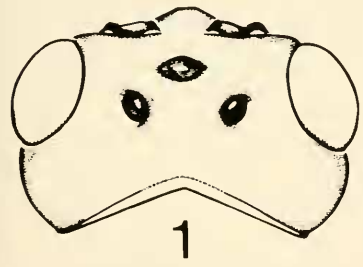
Abdomen as in *evetriae*.

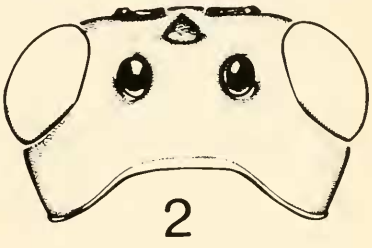
Colour as in *evetriae*.

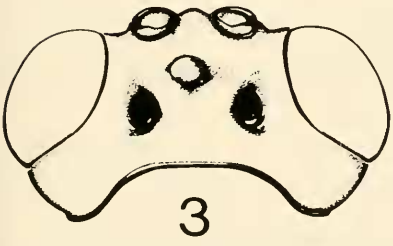
Male – Closely resembles female in structure and colour. Differs in structure mainly in its slightly narrower face, slightly shorter malar space and distinctly more elongate abdominal tergites. The middle trochanters are paler.

This species agrees with *evetriae* in structure and colour, except for a few minor differences as noted in the key and description above. The two species also differ somewhat in their biology and distribution. *Glypta evetriae* is a parasite of larvae that feed in cones of *Pseudotsuga* in some parts of California (Kean, 1958, U.S. Dept. Agr. Tech. Bull. 1169, p. 89), in Montana, Oregon, and southwestern British Columbia. *Glypta zozanae* attacks a borer in the shoots of *Pinus ponderosa* Laws, and as yet has only been found in two localities in the Sierras of California.

TYPES. HOLOTYPE, female, 15 mi SE Groveland, Cal., reared from *Rhyacionia zozana* on *Pinus ponderosa,* autumn 1963, emerged Apr. 1, 1964, R.E. Stevens, USNM.







Figs. 1-4. Dorsal aspect of head, females, 1, *evetriae,* 2, *zozanae,* 3, *eucosmae,* 4, *rhyacioniae.*

PARATYPES, UNITED STATES, California (2 males, 1 female), same data as holotype, also Placerville, reared from *R. zozana* on *P. ponderosa,* coll. Jan.-Apr., emerged June 11, 1964 and May 11, 1964, R.E. Stevens. Paratypes, USNM.

DISTRIBUTION. (Fig. 7).

Glypta eucosmae n. sp.

Glypta n. sp. Drooz, 1960. J. econ. Ent. 53: 248.
Glypta sp. Butcher, 1949. Ms. Thesis, Univ. Minnesota.
Glypta sp. DeBoo, Sippell, and Wong, 1971. Can. Ent. 103: 1483.

Holotype female – Length: front wing 5.5 mm; ovipositor sheath 5.2 mm. Face 0.85 as wide as length of eye. Occipital carina narrowly incomplete above, extending below to base of mandible, weakly sinuate opposite lower part of eye. Temple rather narrow, very broadly rounded, strongly receding (Fig. 3). Ocellocular space slightly greater than diameter of lateral ocellus. Malar space 0.55 basal width of mandible. Apical margin of clypeus weakly convex, without median notch. Antennal flagellum with 36 articles. Face and base of clypeus with dense, rather fine punctures. Space between and immediately above antennal sockets with a pair of short, weak, divergent carinae. Frons with very dense, rather coarse punctures; region above antennal sockets with a few short, transverse wrinkles.

Thorax moderately stout; epomia short; notaulus very weak, ending a little before middle of mesoscutum. Pronotum, mesothorax and propodeum moderately to densely punctate; intervals between punctures, and speculum, polished; posterior declivity of propodeum punctate-rugose. Propodeum with strong, regular, median longitudinal and apical transverse carinae; costulae rather weak and somewhat irregular. Hind wing with nervellus slightly inclivous, intercepted at posterior 0.3.

Abdomen stout; tergites with coarse, dense, and in part more or less confluent punctures; first tergite moderately convex in profile, 1.07 as wide at apex as long; second tergite 1.72 as wide as long (Fig. 5); tergites 2 to 4 with strong, oblique impressions; tergites 5 and 6 strongly retracted. Ovipositor sheath about as long as propodeum and abdomen combined.

General colour of body black. Clypeus except at base, mandible at middle and scutellum at apex dull reddish-brown. Antenna blackish with apex of pedicel yellowish-brown, flagellum brownish-black, paler beneath, especially toward base. Palpi yellowish, tinged with brownish. Tegula and elongate, triangular spot on hind corner of pronotum whitish. Legs fulvous with markings as follows: front leg with most of coxa, trochanters, apex of femur, upper side of tibia, and four basal segments of tarsus whitish; middle leg with trochanters, apex of femur, upper side of tibia and four basal segments of tarsus, except at their apices, whitish; hind leg with basal trochanter whitish in part, distal trochanter entirely whitish, femur narrowly infuscate at apex, tibia whitish with a faint, narrow, sub-basal, fuscous annulus that is interrupted on upper side and beneath is joined by a fuscous stripe to a broader, apical, blackish annulus, tarsus blackish with basal 0.6 of basal segment and bases of segments 2 to 4 successively more narrowly whitish.

Male – Closely resembling female in structure and colour. Differs in structure mainly in its slightly narrower face, slightly shorter malar space, slightly more elongate abdominal tergites 2 to 4 and less strongly retracted apical tergites. Middle coxa mostly whitish and trochanters usually entirely whitish.

Larva – Cephalic structure of final instar (Fig. 6) moderately sclerotized. Epistoma very lightly sclerotized, incomplete, produced dorsally little beyond superior mandibular process. Superior mandibular process well sclerotized, almost as broad at apex as at base, the sides only slightly convergent towards subtruncate apex. Pleurostoma lightly

sclerotized, not well defined. Inferior mandibular process with pointed posterior and anterior strut, posterior slightly longer than anterior. Hypostoma lightly sclerotized, almost straight, without dorsal extension at lateral end. Hypostomal spur large, nearly twice as long as wide at base. Stipital sclerite relatively long, about same width as hypostoma at middle. Labial sclerite rounded, incomplete ventrally, lateral arm slightly enlarged to form a dorsal flange, length to width ratio 1:1, broadest at middle. Prelabial sclerite very lightly sclerotized, not attached to labial sclerite dorsally, attached to labial sclerite ventrally but indistinct. Maxillary and labial palpi small, each with one large and one small sensillum, each with diameter slightly larger than width of lateral arms of labial sclerite. Silk press large, prominent, and heavily sclerotized, with two small sensilla beneath external opening of press. Mandibles relatively small, each with blade slightly curved, without teeth, length of blade slightly less than half overall length of mandible, junction of blade and body of mandible continuous, without interruption or angulation. Antennal sockets lightly sclerotized, each with narrow, lightly sclerotized outer rim, with three small sensilla apparent. Spiracle with three reticulations on atrium, with stalk of four or five annulations and closing apparatus, the latter distant from atrium. Integument densely covered with small cone-shaped protuberances, with a few short setae.

There are differences in the degree and extent of infuscation of adults, some appearing paler, with black replaced by piceous, by ferrugineous, and fulvous by whitish. Differences between *eucosmae* and *rhyacioniae* are as given in the key and in remarks under *rhyacioniae* and are illustrated in Fig. 5.

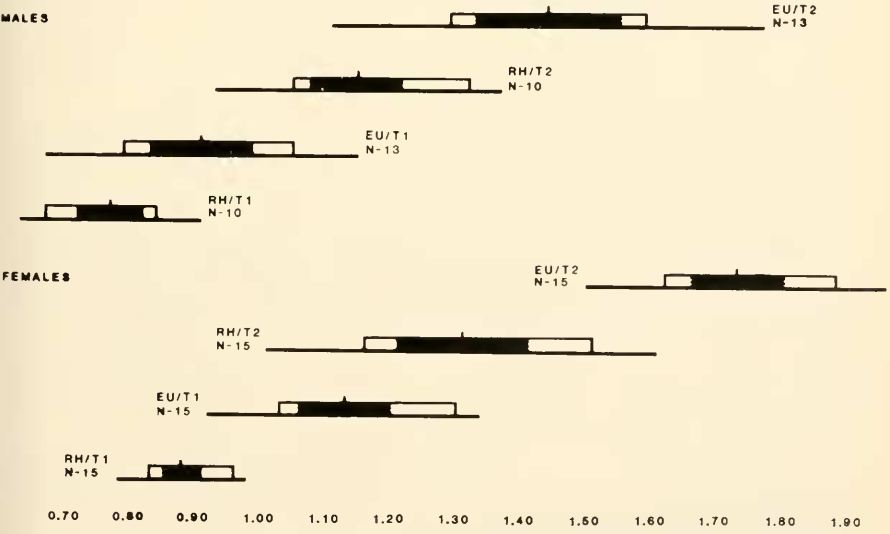


Fig. 5. Variation in length to width ratio of abdominal tergites T1 and T2 of combined population samples of *eucosmae* (EU) and *rhyacioniae* (RH). Samples show range (open bar), mean, standard deviation (closed bar) and 99% confidence limits.

The last instar cephalic structures of species of *Glypta* previously described and figured are *fumiferanae* (Viereck) (Brown, 1947), *haesitator* Gravenhorst (Cameron, 1938), *murinanae* Bauer (Short, 1970), *parvicaudata* Bridgman (Beirne, 1941), and *Glypta* sp. (Short, 1959). The hypostoma of *eucosmae* larvae is only slightly curved as in *fumiferanae, murinanae,* and *parvicaudata,* but is somewhat longer. The hypostoma of *haesitator* and Short's *Glypta* sp. is strongly curved. The hypostomal spur of *eucosmae* is similar to the described species except that of Short's *Glypta* sp. which is smaller. The labial sclerite is rounded, a characteristic of the genus, but is incomplete as in *fumiferanae, parvicaudata,* and Short's *Glypta* sp.; that of *haesitator* and *murinanae* is complete. The silk press is large and well sclerotized as in the other species and the mandibles are characteristic and without teeth.

TYPES. HOLOTYPE, adult female, Galt, Ontario, reared from *Eucosma gloriola,* emerged Mar. 9, 1966, CNC (No. 15213). **PARATYPES, CANADA,** Ontario (52 males, 63 females), reared from *E. gloriola,* emerged late Feb. to late June, Chatsworth, Galt, Hudson, Ignace, Midhurst, Paisley, Simcoe, Thessalon, Valora, Webwood; Manitoba (22 males, 29 females), Sandilands Forestry Reserve, Woodridge. **UNITED STATES,** Connecticut (1 male, 2 females), Stamford, reared from *E. gloriola,* May, 1932, E.P. Felt, Hym. lot No. 7979, *ex* White pine shoot moth, July 8, 1931, *ex* tips of *Pinus strobus,* July 10, 1930, em June 1, 1931; Georgia (8 males, 4 females), Clarke Co., *ex Eucosma cocana* Kft., May 4-14, 1969, B.H. Ebel, Hopk. 47546; Pennsylvania (15 males, 36 females), Knauers, *ex E. gloriola* on Scots pine, Nov.-Jan., 1958, 1959. Specimens from Canada reared in laboratory. Paratypes, USNM, Tow. coll., CNC (No. 15213).

DISTRIBUTION. (Fig. 7).

Glypta rhyacioniae n. sp.

Glypta varipes; Cushman, 1927. J. Agr. Res. 34: 618.

Glypta varipes; Yates, 1967. Key to Nearctic parasites of the genus *Rhyacionia* with species annotations. SE Forest Exp. Stn., Asheville, N.C., U.S. Dep. Agr., Forest Service, p. 73.

Holotype female – Length: front wing 4.7 mm.; ovipositor sheath 6.3 mm. Face 0.8 as wide as length of eye. Occipital carina narrowly incomplete above, joining oral carina below at a point close to base of mandible, very weakly sinuate opposite lower part of eye. Temple narrow, moderately rounded, strongly receding (Fig. 4). Ocellocular space slightly greater than diameter of lateral ocellus. Malar space 0.52 basal width of mandible. Apical margin of clypeus weakly convex, without median notch. Antennal flagellum with 36 articles. Sculpture of face and frons as in *eucosmae* except that carinae between antennal sockets are indistinct.

Thorax and propodeum a little more slender, otherwise as in *eucosmae.*

Abdomen rather slender; first tergite 0.90 as wide at apex as long; second tergite 1.33 as wide as long (Fig. 5). Ovipositor sheath about as long as thorax and abdomen combined. Abdomen otherwise as in *eucosmae.*

Colour essentially as in *eucosmae.*

Male – Closely resembles female in structure and colour. Differs in structure mainly in its slightly narrower face, slightly shorter malar space, slightly more elongate abdominal tergites 2 to 4 and less strongly retracted apical tergites. The middle coxae are

paler, usually mostly whitish.

Colour varies as described under *eucosmae.* Length to width ratios of abdominal tergites 1 and 2 (Fig. 5) between population samples of *eucosmae* and *rhyacioniae* are significantly different.

TYPES. HOLOTYPE, female, Nantucket, Mass., reared from *Rhyacionia frustrana* Comst., emerged Mar. 15, 1926, I.W. Bailey, USNM. **PARATYPES, UNITED STATES,** Massachusetts (10 males, 14 females). Nantucket, reared from *R. frustrana,* Mar. 12-25, 1926, I.W. Bailey, reared from *R. frustrana* on *Pinus rigida,* June 10, 1927, L.G. Baumhofer, reared from *R. frustrana* on *P. resinosa,* June 19, 1927, L.G. Baumhofer, reared from *R. frustrana,* May 27, 1926, Nantucket Island, reared from Nantucket pine tip moth, May 15, 1932, E.P. Felt, Hym. lot No. 7979; Sharon Hts., reared from *R. frustrana* on *Pinus rigida,* Apr. 28 - May 6, 1915, C. Heinrich, reared from *R. frustrana* on *P. mughus,* Apr. 30, 1915; New York (2 males), Croton Falls, "host in red pine", Aug. 7, 1933, *leg.* Purdeys. Paratypes, USNM and CNC (No. 15214).

DISTRIBUTION. (Fig. 7).

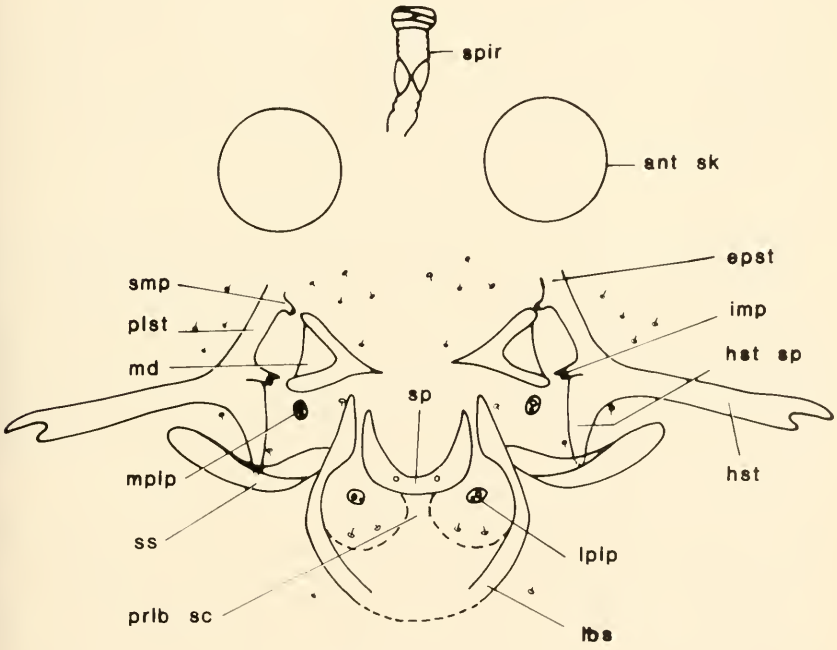


Fig. 6. Cephalic structures of final instar of *eucosmae;* ant sk, antennal socket; epst, epistoma; hst, hypostoma; hst sp, hypostomal spur; imp, inferior mandibular process; lbs, labial sclerite; lplp, labial palp; md, mandible; mplp, maxillary palp; plst, pleurostoma; prlb sc, prelabial sclerite; smp, superior mandibular process; sp, silk press; spir, spiracle; ss, stipital sclerite.

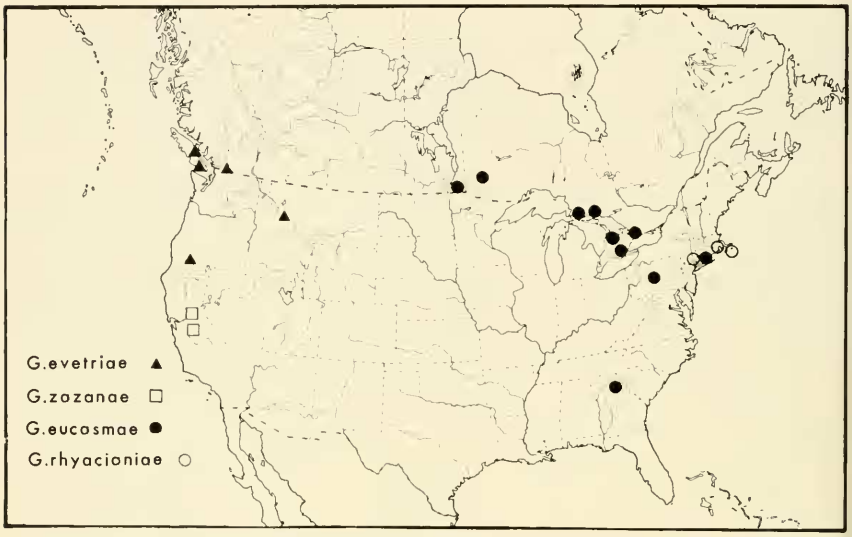


Fig. 7. Distribution of specimens of *evetriae, zozanae, eucosmae, rhyacioniae.*

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